

Island, R. I., the winds attained hurricane force, strewing Vineyard Sound, Nantucket, Cape Cod, and the Maine coast with many wrecks. Beach property along the coast in some places suffered much damage, and there was considerable loss of life. The press of the city places the loss by damage from the wind and rain, for New England, at \$1,000,000. The rainfall was very heavy, except in some of the southeastern sections of the district, the amounts reaching several inches, and the downpour caused much damage by floods and washouts to fields and roads. Remarkable and unusual phenomena attended the storm at points on the Massachusetts coast. At Woods Hole, during the early hours of the gale, the tide rose several feet above the mean high-water mark. This was followed by a drop which was as unusual as the rise, the tide dropping 7 feet in fifty minutes, and to a point 5 feet below the average. Storm warnings were ordered and bulletins issued well in advance of the storm, and doubtless resulted in the saving of many lives and much property.

The frosts, and in some sections, freezing weather on the 22d and 23d were unusually severe and early for the season. They were duly anticipated and announced in the forecasts.—*J. W. Smith, District Forecaster.*

NORTH-CENTRAL FORECAST DISTRICT.

Storm warnings were ordered up on the evening of September 1, and the morning of the 2d, for a storm that advanced northeastward from the southern Rocky Mountain region to the Lakes. High velocities were reported at many stations, but the storm lost force by the night of the 2d. Warnings were ordered on Lakes Michigan and Huron on the morning of September 20, in advance of high northerly winds which prevailed over those lakes. They were again hoisted on the eastern half of Lake Superior on the morning of September 30. The stations at Marquette and Sault Ste. Marie reported unusually high winds, the velocity attaining 56 miles per hour from the northwest at the latter station.

Frost warnings were issued several times during the month. The high pressure area which appeared in the British Northwest on the morning of the 10th advanced southeastward, and by the morning of the 12th had caused light to heavy frosts over the entire district. Another such condition, but more severe, appeared in the extreme northwest on the morning of the 12th and followed about the same course as its predecessor, and by the 15th had caused frosts over the entire district. Another high area, accompanied by frost, moved across the northern tier of States during the 20th and 21st. On account of the lateness of the corn crop, these warnings and the ensuing frosts affected in a great degree the price of corn, as it was supposed that great injury would result. However, except from a speculative point of view, these warnings were not important, because no protection from frost conditions can be afforded the growing crop. Warnings of these frosts were sent to the cranberry growers of Wisconsin, and it gave them opportunity to flood the marshes and prevent damage to the berries.—*H. J. Cox, Professor and District Forecaster.*

WEST GULF FORECAST DISTRICT.

The early part of the month was showery, and moderate temperatures prevailed. The close of the month was marked by unseasonably high temperatures, and the maximum, 94° on the 30th, broke all previous records for the last decade in September. The month was free from disturbances, and no special warnings were issued.—*I. M. Cline, District Forecaster.*

ROCKY MOUNTAIN FORECAST DISTRICT.

Apart from the heavy rainfall in New Mexico and southeastern Colorado, and the absence of destructive frosts in the principal horticultural and agricultural districts, the month was devoid of unusual conditions. Such frosts as were noted occurred in the high districts, and were well covered by the forecasts.—*F. H. Brandenburg, District Forecaster.*

SOUTH PACIFIC FORECAST DISTRICT.

A warm wave passed over California from the 6th to the 9th; it was very intense in the San Francisco Bay section on the 7th and 8th, when the previous maximum temperature recorded at San Francisco, of 100° was exceeded. In the interior valleys on these dates, the maxima ranged from 100° to 108°. Little or no damage resulted from the heat.

A well-defined storm covered the district from the 22d to the 25th, causing rain and numerous thunderstorms throughout California and Nevada. The rain was abnormally heavy in northern California, and on the northern coast of southern California. At San Francisco, where the record began in 1850, the greatest previous amount for September was 1.06 inches, against 5.07 this year. A remarkable feature of the storm was the great number of thunderstorms accompanying it. Much damage was caused in San Francisco by the water flooding basements and stopping street car traffic in the lower portions of the city. Great loss was caused to drying fruit, hay, grain, and beans in the fields, and to table and wine grapes. Ample warnings of the storm were given and generally heeded, but the rains were so heavy that protection in many cases was impossible.

Southeast storm warnings were displayed from San Francisco to Eureka at 11 a. m. on the 22d, and advisory messages sent to all southern ports. These warnings were continued on the 23d and 24th. No high winds occurred at either San Francisco or Eureka during this period, but the warnings were verified at Point Reyes and Southeast Farallon, and vessels coming into port during and since the storm reported very rough weather outside.—*G. H. Willson, District Forecaster.*

NORTH PACIFIC FORECAST DISTRICT.

The month of September was unusually dry up to the 21st, when a disturbance of moderate energy moved southward along the coast to California, causing general rain throughout the district, and moderately high southeasterly winds along the Washington coast. Southeast storm warnings were displayed at the mouth of the Columbia River, and along the Strait of Fuca, from Port Townsend westward to Cape Flattery, on the afternoon of the 21st. The rains, while generally insufficient to effectually break the long continued drought, put out the forest fires, cleared the atmosphere of smoke, and slightly revived vegetation.

Light frost, for which warnings were issued, occurred east of the Cascade Mountains on several mornings. West of the Cascades no frost of consequence occurred.—*A. B. Wollaber, District Forecaster.*

RIVERS AND FLOODS.

The Mississippi, Missouri, and Ohio rivers were considerably lower during this month than in the corresponding month of the year 1903, and more nearly approached the normal low-water conditions that are to be expected at the beginning of the autumn season. Navigation proceeded as usual on the Mississippi River, and was not seriously interrupted on the Ohio. The Tennessee River continued to fall steadily throughout the month, and readings below zero were reported at many stations; navigation had already been suspended on the upper river, and very little was possible below.

The rivers of the Atlantic system were quiet as a rule; the heavy rains of the middle of the month caused a sharp swell in all districts, but the stages reached were quite moderate except in the Roanoke and Cape Fear rivers, where danger-line stages were exceeded. At Fayetteville, N. C., the Cape Fear River rose more than 46 feet from the 14th to the 17th; warnings for this flood were issued on the 15th. Reports of the mountain floods in the Southwest have not yet been received, and they will appear at a later date. Warnings were issued on the 17th for the flood in the Rio Grande, the only

river in that section on which river and flood service is maintained.

The work of extension of the River and Flood Service has progressed steadily since July 1, 1904, the date on which the increased appropriation for that purpose became available, and by the end of September new stations had been established as follows:

Milk River, Havre, Mont.; Big Blue River, Blue Rapids, Kans.; Republican River, Clay Center, Kans.; Solomon River, Beloit, Kans.; Smoky Hill River, Lindsborg, Kans.; Abilene, Kans.; Kansas River, Manhattan, Kans.; Topeka, Kans.; Gasconade River, Arlington, Mo.; Missouri River, Blair, Nebr.; Minnesota River, Mankato, Minn.; St. Croix River, Stillwater, Minn.; Red Cedar River, Cedar Rapids, Iowa; Iowa River, Iowa City, Iowa; Scioto River, Circleville, Ohio; Kentucky River, Jackson, Ky.; Powell River, Tazewell, Tenn.; Little Tennessee River, McGhee, Tenn.; St. Francis River, Marked Tree, Ark.; Neosho River, Neosho Rapids, Kans.; Iola, Kans.; Oswego, Kans.; Fort Gibson, Ind. T.; Canadian River, Calvin, Ind. T.; Black River, Blackrock, Ark.; White River, Calicorock, Ark.,

Batesville, Ark.; Clarendon, Ark.; Arkansas River, Tulsa, Ind. T.; Mississippi River, St. Cloud, Minn.; Warsaw, Ill.; Luxora, Ark.; Lehigh River, Mauch Chunk, Pa.; Schuylkill River, Reading, Pa.; Delaware River, Hancock, N. Y. (east branch), Hancock, N. Y. (west branch), Port Jervis, N. Y.; Phillipsburg, N. J.; Trenton, N. J.; Catawba River, Mount Holly, N. C.; Oconee River, Milledgeville, Ga.; Yuba River, Colgate, Cal.; Sacramento River, Knights Landing, Cal.; Rio Vista, Cal.

Nineteen rainfall stations have also been established, and there remain to be established about 35 river and a few rainfall stations.

The highest and lowest water, mean stage, and monthly range at 228 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Division.

The following summaries relating to the general weather and crop conditions during September are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000 respectively:

Alabama.—Some locally heavy rains, but generally dry, hot weather prevailed, except rather cool middle of month; light frost in Walker County on 16th. Cotton continued to deteriorate from rust and shedding during first two decades, some damage by bollworms and premature opening, greater portion open by close of month, when over one-half picked. Gathering of early corn progressed slowly, yield continuing very good. Minor crops fairly good, though all late crops injured by drought.—*F. P. Chaffee.*

Arizona.—The rainfall during September was generally less than normal, but crops did not suffer from lack of moisture. Temperatures were generally moderate, but the latter part of the month was rather cool, and light frosts occurred in northern districts. But little damage resulted, however, as crops were too far advanced. The month was generally favorable to agricultural interests, and crops did well. Grass was abundant on ranges, and it cured nicely as hay, promising plenty of winter feed. Stock was in fine condition.—*M. E. Blystone.*

Arkansas.—The temperature was excessive and the rainfall deficient; drought caused late crops to deteriorate. Cotton opened rapidly; picking general at close of month; top crop light. Good crop of early corn being gathered; late promised a poor crop owing to lack of moisture. Irish potatoes fair crop; sweet potatoes good crop. Less than usual acreage sown to fall grains, as ground was too dry to plow. Apples fair crop of medium quality.—*O. C. Burrows.*

California.—Temperature and rainfall records were both broken during the month. At San Francisco the maximum temperature on the 8th, 101°, was the highest ever recorded for any month. The rainfall at San Francisco from the 22d to 26th, 5.07 inches, was 4.80 inches above the average for thirty-three years, and it was equally heavy throughout the central and northern sections, with abnormally heavy downpours in portions of southern California. Thunderstorms were more severe and frequent than usual in all parts of the State. Heavy snow fell in the high Sierra. Grapes, beans, grain in sacks, and unprotected hay were quite seriously damaged by rain.—*Alexander G. McAdie.*

Colorado.—Month favorable; fore part too dry for plowing and sowing, but drought relieved during last decade. Grain harvest, haying, and fodder cutting finished; thrashing under way; beet pulling and potato digging begun. Corn somewhat damaged by frost on 13th and 14th, but by close of month generally out of danger of further damage. Range cured well, but was considerably damaged by heavy rains during closing days. Fine crops of fruit and melons marketed.—*F. H. Brandenburg.*

Florida.—Cotton picking was generally favored by the lack of rain and at the close of the month cotton was about three-fourths harvested; on account of the ravages of caterpillars and other insects the yield was considerably below the average. Corn was mainly housed with fairly satisfactory yields. Cane did well and cutting had commenced in some localities. Citrus fruits had begun to color in the central districts, and marketing had begun south. Fruit trees looked well, but gardens showed lack of rain.—*R. T. Lindley.*

Georgia.—An unusually warm and dry September. During the first

half cotton was damaged by rust, shedding, and caterpillars, top crop a failure; bolls opened fast, many prematurely; picking progressed rapidly, staple generally marketed as fast as ginned; labor scarce; yield above average; crop about all gathered in southern section, with rapid advance elsewhere. All minor crops seriously injured by drought. Corn crop being housed, yield good. Large crops of fodder and hay saved. Very little fall plowing.—*J. B. Ma-bury.*

Idaho.—The first two decades of the month were clear, warm, and dry; during the last ten days there was an increase in cloudiness and wind movement and occasional light showers. Weather was very favorable for the harvesting of all crops. Packing and shipping of prunes was nearly complete by the end of the month. Ranges became very dry, but stock was generally in good condition. Shipping of cattle and sheep was active during the month.—*Arthur W. Garrett.*

Illinois.—Fall plowing was actively prosecuted during the first decade and some seeding was done. Corn was generally reported to be late. Light frosts formed on the 15th, but no material damage ensued. Reports received during the second decade indicated a more favorable outlook for apples in the northern half. At the end of the month a considerable proportion of the corn crop was safe from frost in the southern half, and it was reported that the bulk of the crop in all sections would be safe by October 10.—*Wm. G. Burns.*

Indiana.—Dry until the 12th, but sufficient moisture afterward. Corn was nearly all matured in the northern and southern sections, but in the central section about 10 per cent was yet in danger from frost; cutting and shocking began about the 15th. Plowing, wheat and rye seeding, cutting and housing tobacco, hulling clover, and digging potatoes were nearly completed, clover and potatoes yielded fair and tobacco generally poor. Apples were faulty and fell badly.—*A. V. Randall.*

Iowa.—With temperature about normal, and less than average rainfall, the conditions were generally favorable for ripening corn and other belated crops. The most serious drawback was the occurrence of light to heavy frosts on the 14th, 15th, and 21st, but damage to immature corn was light, being limited to lowlands and relatively small portion of area planted. The fine weather in the closing decade brought 90 per cent of the crop to maturity. As a whole the season was favorable.—*John R. Sage.*

Kansas.—Corn cutting continued. Late corn filled well, was nearly all hard, well matured, and out of danger from frost. Wheat sowing began first week, was well advanced the last week. The early sown wheat came up, showing a good stand. A large crop of fine prairie hay was put up. The fourth cutting of alfalfa began the last week. Apple picking began the last week, generally a good crop. Potato digging began. Pastures good.—*T. B. Jennings.*

Kentucky.—The rainfall was nearly normal, but as it was irregularly distributed, some localities suffered from drought while others had abundant rain. High temperatures were reported from 1st to 3d and from 24th to 30th, but moderate temperature prevailed at other times. Light frost occurred in many places on the 15th and 16th, but the damage was slight. The weather was generally favorable for maturing and harvesting crops, and at the end of the month nearly everything was secured except late fields of tobacco and corn. Sowing of wheat progressed well during the last week.—*H. B. Hersey.*

Louisiana.—Showers early in the month interfered with cotton picking and caused some seed to sprout in the bolls. Dry, warm weather later caused cotton to open rapidly and picking was pushed forward, although